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RISK IDENTIFICATION AND REDUCTION IN INTEGRATED PRODUCT TEAMS

Prepared by: Robert G. Batson, Ph.D.

Academic Rank: Professor

Institution and Department: The University of Alabama
Department of Industrial Engineering

MSFC Colleague(s): Glen D. Ritter
L. Don Woodruff

NASA/MSFC:

Office: Systems Analysis and Integration
Division: Systems Definition
Branch: Aerospace Systems Branch

Introduction

This brief report summarizes research and planning conducted during Summer 1993 for MSFC on the subjects of risk identification, assessment, and management. Research findings are presented, citing useful references. The major output of this work, the AXAF-S Project Risk Management Plan is outlined.

Body

Risk Identification, the first step in the three-step risk analysis process (1), consists of definition and characterization of all potential problems including analysis of cause-and-effect, primary/secondary impacts on the project, and a qualitative assessment of whether each potential problem is high, medium, or low risk. Risk identification is best done via team meetings, individual interviews, or questionnaires--using the experience and technical details available in the project. There are other sources of risk identification information (Garland Bauch, NASA/JSC GM3/SSP Configuration Management, identified over fifty possibilities in collaboration with the author during July 1993) which may fit neatly into the following six categories: 1) Checklists, lessons learned, and so-called risk "templates"; 2) One-on-one interviews, questionnaires; 3) Formal project or engineering reviews; 4) Cause-and-effect diagrams, brainstorming; 5) Tiger Teams, external reviews; 6) Extracts from project documents such as planning documents in the "illities", and requirements documents.

Risk assessment, the second step in risk analysis, uses information from risk identification, probability encoding techniques, and various quantitative methods to synthesize the input uncertainties into an overall assessment of program risk. Risk assessment techniques and the necessary math models they use are fully detailed in (1, 2).

Risk management (4) uses information from risk identification and risk assessment in decision-making in order to reduce risk. Risk management occurs when the appropriate manager or team takes action to avoid a risk, or to handle it in some way. Risk management strategies are numerous, and must fit the given project or situation. General categories of risk management strategies are: 1) Risk avoidance--select a lower risk alternative, or eliminate a requirement or system element; 2) Risk control--actions taken to either reduce the probability of a problem occurring, or to mitigate the consequences if it should occur; 3) Risk transfer--either transfer or share risk through mechanisms such as contract-types and warranties, or change the risk from one form (e.g., schedule) to another (cost); 4) Risk assumption--based on an informed understanding of the potential problem (i.e., its probability and consequences), agree to do nothing and accept the consequences should the problem occur; 5) Knowledge and research--when a team cannot select strategies 1-4 based on inadequate information, they may appoint a Tiger Team or even set-up a small R&D project to increase their knowledge of the risk.

Finally, a sixty-page "AXAF-S Project Risk Management Plan" was written. This comprehensive plan for a project risk analysis activity, focused on the AXAF-S top-level team (the Core Product Development Team) as the decision authority for risk management and tracking, includes the results of the preliminary AXAF-S risk area identification activities as a series of tables in Section 4.0. An outline of this plan is provided in Table 1 below. The Risk Reduction Plans and concept for the Risk Tracking System are based on ideas in (4, Chapter 12 and 13) .

Table 1. AXAF-S Project Risk Management Plan Table of Contents

References

1. Batson, R.G., Program Risk Analysis Handbook, NASA Technical Memorandum TM-100311, NASA George C. Marshall Space Flight Center, August 1987.

2. Information Spectrum, Inc., Risk Assessment Techniques: A Handbook for Program Management Personnel, Defense Systems Management College Textbook, July 1993.

3. Lockheed Missiles & Space Company, Systems Engineering Management Guide, Defense Systems Management College Textbook, 1983.

4. The Analytic Sciences Corporation, Risk Management: Concepts and Guidance, Defense Systems Management College Textbook, March 1989.